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Cornelius, L.R.; van der Klink, J.J.; Groothoff, J.W.; Brouwer, S.

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# Prognostic Factors of Long Term Disability Due to Mental Disorders: A Systematic Review

L. R. Cornelius · J. J. L. van der Klink ·  
J. W. Groothoff · S. Brouwer

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**Abstract** *Introduction* In the past few decades, mental health problems have increasingly contributed to sickness absence and long-term disability. However, little is known about prognostic factors of return to work (RTW) and disability of persons already on sick leave due to mental health problems. Understanding these factors may help to develop effective prevention and intervention strategies to shorten the duration of disability and facilitate RTW. *Method* We reviewed systematically current scientific evidence about prognostic factors for mental health related long term disability, RTW and symptom recovery. Searching PubMed, PsycINFO, Embase, Cinahl and Business Source Premier, we selected articles with a publication date from January 1990 to March 2009, describing longitudinal cohort studies with a follow-up period of at least 1 year. Participants were persons on sick leave or receiving disability benefit at baseline. We assessed the methodological quality of included studies using an established criteria list. Consistent findings in at least two high quality

studies were defined as strong evidence and positive findings in one high quality study were defined as limited evidence. *Results* Out of 796 studies, we included seven articles, all of high methodological quality describing a range of prognostic factors, according to the ICF-model categorized as health-related, personal and external factors. We found strong evidence that older age (>50 years) is associated with continuing disability and longer time to RTW. There is limited evidence for the association of other personal factors (gender, education, history of previous sickness absence, negative recovery expectation, socio-economic status), health related (stress-related and shoulder/back pain, depression/anxiety disorder) and external i.e., job-related factors (unemployment, quality and continuity of occupational care, supervisor behavior) with disability and RTW. We found limited evidence for the association of personal/external factors (education, sole breadwinner, partial/full RTW, changing work tasks) with symptom recovery. *Conclusion* This systematic review identifies a number of prognostic factors, some more or less consistent with findings in related literature (mental health factors, age, history of previous sickness absence, negative recovery expectation, socio-economic status, unemployment, quality and continuity of occupational care), while other prognostic factors (gender, level of education, sole breadwinner, supervisor support) conflict with existing evidence. There is still great need for research on modifiable prognostic factors of continuing disability and RTW among benefit claimants with mental health problems. Recommendations are made as to directions and methodological quality of further research, i.e., prognostic cohort studies.

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L. R. Cornelius (✉) · J. J. L. van der Klink ·  
J. W. Groothoff · S. Brouwer  
Department of Health Sciences, Section of Social Medicine,  
Work and Health, University Medical Center Groningen,  
University of Groningen, Antonius Deusinglaan 1,  
Building 3217, Room 620, 9713 Groningen, The Netherlands  
e-mail: l.r.cornelius@med.umcg.nl

L. R. Cornelius · J. J. L. van der Klink ·  
J. W. Groothoff · S. Brouwer  
Groningen Graduate School for Medical Sciences,  
University Medical Center Groningen, University of Groningen,  
Groningen, The Netherlands

L. R. Cornelius  
Social Security Institute (UWV), Groningen, The Netherlands

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## Introduction

Results from psychiatric epidemiologic surveys in Europe and in the USA have shown that mood, anxiety and substance use disorders are highly prevalent in the general population, in primary care settings and among workers [1–3]. In the population of industrialized western countries, lifetime prevalence of any mental disorder range from 37.5 to 48.6, and 12-month prevalence from 19.9 to 29.1 [4].

In the past few decades, mental health problems have increasingly contributed to sickness absence and long-term disability [5, 6]. The Organization for Economic Cooperation and Development (OECD) reports in a recent paper that mental health problems now account for one-third of all new disability benefit claims on average, rising to as high as 40–50% in some member states [7]. In that paper the OECD shows that in the past 10–15 years, the inflow into disability benefits due to mental health conditions has almost doubled in some countries. In the Netherlands in the late 1960s, mental disorders accounted for 11% of all sickness absence with a duration longer than 1 year. From then on up to the present, this percentage has risen to 30% [8, 9].

Besides huge economic costs at population level [7, 10], long term disability in general and due to mental health conditions in particular, is associated at the individual level with lower socio-economic status, reduced quality of life and higher morbidity/mortality rates [11]. It is therefore of great importance to prevent the transition of short term sickness absence into long term or permanent disability and to rehabilitate those persons already on long term disability benefit by facilitating return to work (RTW).

It is widely recognized that causes of sickness absence and disability are multifactorial and not associated with medical conditions alone [12, 13]. Systematic reviews on this topic primarily focused on musculoskeletal and pain-related health conditions [14, 15].

However, research on prognosis of long term disability due to mental disorders is scarce. Blank et al. [16] conducted a systematic review in 2008 of all papers relating to RTW or risk of job loss resulting from long term absence due to mental illness. They found 14 articles of varying methodological quality identifying a range of factors restricting RTW, related to work, family history, health risk behaviours, social status and medical condition. In that review, all study types were included and studies dealing with absences for more than 6 months were excluded.

In the Dutch social security system, disability benefit assessment takes place after a period of 2 years of sickness absence [17]. At that moment mental disorders account for 30% of all disability claims [9]. Factors associated with sustained disability and RTW of Dutch benefit claimants after this 2 year period are not known. Evidence based

knowledge about prognostic factors of long term disability and RTW of persons already on sick leave lasting longer than 6 months due to poor mental health is missing. Understanding these factors, and in particular those which are amenable to change through any intervention program, may help to develop effective prevention and interventions to facilitate RTW for long-term disabled persons. To our knowledge, the literature on long term disability and RTW due to poor mental health has not yet been reviewed systematically, including longitudinal study types only and irrespective of the duration of preceding sickness absence.

## Objectives

The aim of this review is to investigate systematically current scientific evidence about the prognostic factors for long term disability and RTW of persons sick listed due to mental health problems, and factors for recovery of mental health symptoms.

## Methods

The first (LRC) and second reviewer (SB) discussed search strategy, criteria for selecting studies, quality assessment and data extraction to reach consensus. In case of disagreement the third reviewer (JvdK) made the final decision.

### Search Strategy

The first author and an experienced medical librarian performed an extensive search in biomedical, psychological and economic databases (PubMed, PsycINFO, Embase, Cinahl, Business Source Premier) to find relevant articles, using MeSH terms, subheadings and free text words, see Table 1. The search was limited to articles with a publication date from January 1990 to March 2009. Additionally, we searched for other relevant articles using the name of the first author and the reference lists of included articles.

Titles and abstracts were screened independently by two reviewers (LRC, SB). Full papers were retrieved if the abstract provided insufficient data to enable selection. Only papers written in English, German, French and Dutch were considered for inclusion in this review.

### Criteria for Selecting Studies

To reach overall agreement (LRC, SB) on in- and exclusion criteria, we pilot-tested preliminary criteria in 20 full text articles randomly selected from the initial search. To also include retrospective cohort studies as type of study, we omitted from the preliminary list the term prognostic.

**Table 1** Search terms  
(<sup>a</sup> = truncated)

Terms linked to	MeSH	Subheading	Free text words
Diagnosis	Mental disorders		Mental illness Mental morbidity Mental comorbidity Psychiatric disorder <sup>a</sup> Psychiatric diagnos <sup>a</sup> Psychiatric morbidity Psychiatric comorbidity Mental problems Psychiatric problems Sick-listed Disability pension <sup>a</sup> Sickness benefit <sup>a</sup>
Population	Sick leave Insurance, disability Pensions		
Study design	Cohort study, case control study	Epidemiology Economics Statistics and numerical data	

**Box 1** In- and exclusion criteria*Types of studies*

Observational studies, i.e., case–control studies, cohort studies, follow-up studies or longitudinal studies with a minimum follow-up period of 1 year

*Types of participants*

Wholly or partially disabled persons in the age bracket 18–64 years who are on sick leave, who claim disability benefits or who are receiving disability pensions at baseline, because of disability due to mental disorders. Duration of sick leave or disability is not an in- or exclusion criterion in order to include all durations

*Types of outcome measures*

Dependent variables: symptom recovery, improvement of functioning; reduction of disability; expanding of activities; heightening of social participation; return to work. Independent variables: nature and severity of mental disorder focusing on depression, anxiety disorder and substance use disorder; demographics; health service use; adequacy of treatment; coping strategies and social support

We added the term symptom recovery as type of outcome measure. The final in- and exclusion criteria are presented in Box 1.

**Assessment of Methodological Quality**

We based the quality assessment of the selected studies on an established criteria list for assessing validity of prognostic studies, as recommended by Altman [18]. This list consists of 16 items, each having yes/no/don't know answer options. Scholten-Peeters et al. [19] operationalized this criteria list for use in a systematic review on prognostic factors of whiplash. With permission of the author, we pilot tested this operationalization on agreement in an assessment of three studies on prognostic factors of whiplash and modified the list for use in the present review. This modified criteria list is presented in Appendix Table 8.

The quality of all included articles was scored independently by two reviewers (LRC, SB). If sufficient

information was available, the item was rated one point. When information was not given or the information given was unclear, the item was rated zero point. For the total quality score we added all points for each study (maximum score 16 points).

Studies with a minimum score of 11 points ( $\geq 70\%$ ) were arbitrarily considered to be of high quality and those with a score lower than 11 points ( $<70\%$ ) of low quality. We calculated initial interobserver agreement on methodological quality using kappa statistics for dichotomous values.

**Data Extraction**

Using a standardized form, the first reviewer (LRC) extracted data on study design, source population, inclusion and exclusion criteria, numbers of participants, length of follow-up, loss to follow-up, outcome, prognostic factors and statistical analysis.

## Levels of Evidence

Based on Sackett et al. [20] and similar to the approach used by other systematic reviews [21], we defined four levels of evidence to determine the strength of association of prognostic factors with outcome: strong, moderate, limited and inconclusive evidence, see Table 2. Non-significant effects cannot contribute to consistency. Findings of one high quality study opposing consistent findings in one or more low quality studies would result in a situation of inconclusive evidence.

## Results

### Selection of Studies

The initial search yielded 796 articles (search date: March 9th 2009). After selecting 36 references for full text

**Table 2** Levels of evidence for prognostic factors

Level	
Strong	Consistent findings ( $\geq 80\%$ ) in at least two high quality studies
Moderate	One high quality study and consistent findings ( $\geq 80\%$ ) in one or more low quality studies
Limited	Findings of one high quality study or consistent findings ( $\geq 80\%$ ) in one or more low quality studies
Inconclusive	Inconsistent findings irrespective of study quality

reading, both reviewers (LRC, SB) agreed to include four articles for the present review. Searching the reference lists of those included articles, we found and included one additional article. Based on the name of the first author of the four included articles, we found two other relevant articles. In total we included seven articles for the present review [22–28]. Table 3 shows a flow chart of study selection.

### Methodological Quality Scores

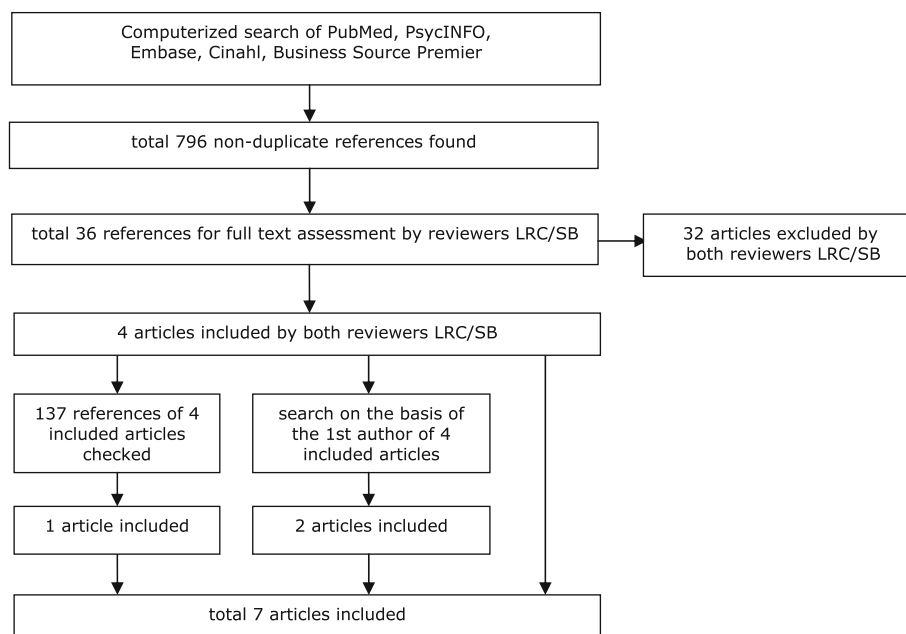
The final overall agreement between the two reviewers (LRC, SB) on quality score was  $\kappa = 0.84$ , which is considered to be very high. Disagreement originated mainly from reading errors and misinterpretation of the criteria list and was readily resolved in a consensus meeting. The methodological quality of all included studies is summarized in Table 4.

All studies were of high quality with sum scores ranging from 13 to 16 points. Across studies, the maximum score of each item was 7 points. The following items had  $<7$  points: no inception cohort (item A, 5 points), no information of completers versus loss to follow-up (item F, 5 points), no (or insufficient) description of treatment used in the study population (item H, 3 points) and clinically relevant outcome measures (item L, 6 points).

### Study Characteristics

The characteristics of each study as to quality score, design, recruitment, source population, case definition,

**Table 3** Flow diagram of study selection



**Table 4** Results of methodological assessment

Study	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Score (%)
Brenninkmeijer et al. [22]	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	15 (93.7)
Engström and Janson [23]	0	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	13 (81.3)
Nieuwenhuijsen et al. [24]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16 (100)
Nieuwenhuijsen et al. [25]	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	15 (93.7)
Nieuwenhuijsen et al. [26]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16 (100)
Nieuwenhuijsen et al. [27]	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	14 (87.5)
Vaez et al. [28]	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	14 (87.5)
Total	5	7	7	7	7	5	7	3	7	7	7	6	7	7	7	7	

See Appendix Table 8 for operationalization of items A–P

response, numbers enrolled, measurements, follow-up, and loss to follow-up are presented in Table 5. Registry data were used in four studies [23, 24, 26, 28]. Only two studies linked registry data to data collected separately by other measurements, e.g., interview or questionnaire [24, 26]. Duration of sickness absence at baseline varied from 2 to 35 days (24) to  $\geq 90$  days [28].

Table 6 summarizes the study characteristics as to outcomes, prognostic factors and results. Only significant associations and prognostic factors are mentioned. The included studies used two types of outcome measures as dependent variables: disability (including RTW) and symptom recovery. Over 60 different types of prognostic factors were investigated (e.g., gender, age, socio-economic status, diagnosis, beliefs, occupational care, job- and employer-related factors). Statistical pooling of data in a meta-analysis was not possible due to the heterogeneity of study population, type of prognostic factors, outcome measures and study quality.

### Evidence Synthesis

In Table 7 we present a qualitative summary of the evidence for all prognostic factors and their associations with disability duration and symptom recovery as outcome variables. In accordance with the International Classification of Functioning, Disability and Health (ICF-model), the prognostic factors are categorized as health-related factors, personal factors and external factors [29]. Only factors that are significantly associated with an increase or decrease of outcomes are mentioned. Table 7 also includes the modifiability of separate factors.

We found strong evidence that older age ( $>50$  years) is associated with continuing disability and longer time to RTW for persons who are sick listed at baseline due to mental health problems. There is limited evidence for the association of health related factors (stress-related and shoulder/back pain, depression/anxiety disorder) with a longer duration of disability. We also found limited

evidence that personal factors other than age (male gender, education, previous sickness absence, own expectation of duration of the absence  $>3$  months, low socio-economic status) are related to continuing disability. We found limited evidence that full or partial RTW and changing work tasks is associated with symptom recovery. Furthermore, we found limited evidence for the association of external factors (unemployment, poor quality of interventions by the occupational physician aimed at the organization, poor continuity of occupational care, supervisor consulting with professional) with an increase of disability. There is limited evidence for the association of supervisor communication with the employee with a decrease of disability. There is limited evidence for the association of lower education and the position of sole breadwinner with an increase of poor mental health on a symptom level.

### Discussion

In this systematic review we identified a total of 17 significant factors: 13 factors associated with disability/RTW, and 4 factors associated with symptom recovery, see Table 7. Of the 13 factors related to disability/RTW, only two factors were directly related to mental health, while the other 11 factors were of a personal or external nature in terms of the ICF-model. This seems to confirm the hypothesis that long term disability is for a large part related to non-medical conditions.

#### Health Factors

We found limited evidence for the association of stress-related and shoulder/back pain, and depression/anxiety disorder with a longer duration of disability. There is also limited evidence among non-depressed workers that better communication between supervisor and employee shortened time to full RTW. Disability and RTW outcomes may be influenced by a specific health factor, i.e., the prevalence

**Table 5** Study characteristics

Study	Score	Design	Recruitment and source population	Case definition	Response	Numbers enrolled	Measurement	Follow-up	% Lost to follow-up
Breninkmeijer et al. [22]	15	Prospective cohort study; 2 measurements: T1 after 13 weeks of sickness; T2 after 1 year	Three social insurance companies, Utrecht, The Netherlands; inclusion in 2002; source population: $n = 7,864$	Sick-listed 12–20 weeks; high level of psychological distress (GHQ-12 $\geq 5$ ); sickness due to psychological complaints; cause of sickness; work situation and private life	Screening: 42% 1st interview T1: 93% 2nd interview T2: 79%	$n = 555$	(1) Screening: GHQ-12 <sup>a</sup> (2) Telephone interview: SCL-90 <sup>b</sup> JCQ <sup>c</sup> Self report Registry data	1 year	14%
Engström and Janson [23]	13	Prospective cohort study; 3 annual measurements after 1, 2 and 3 years of follow-up	Social insurance office Värmland, Sweden; all individuals sick registered one November week 2000; $n = 7,273$	Sickness absence >28 days; stress-related psychiatric disorder	100% (registry data)	$n = 911$	Registry data	3 years	1.9%
Nieuwenhuijsen et al. [24]	16	Retrospective cohort study	35 Different occupational physicians (OP)	Medical files of first 100 patients on sick leave due to adjustment disorders visiting OP in 1999 and 2000; first time visit since onset; 100% absent from work; no major psychiatric disorder; no prominent somatic disorder	100% (registry data)	$n = 100$	(1) File: Length of sickness absence (2) OP guideline: 10 OP performance indicators	1 year	0%
Nieuwenhuijsen et al. [25]	15	Part of longitudinal cohort study; measurements: Employees: at baseline, 3, 6, 12 months Supervisors: 6 months	Consecutive patients reported by 30 occupational physicians of 9 occupational health services; Amsterdam, The Netherlands; inclusion: march 2001–february 2002; source pop.: $n = 277$	Employees with self reported psychological symptoms; on sick leave <6 weeks	Consent to participate: 76%; baseline questionnaire: 71%; consent to contact supervisor: 48% (of $n = 198$ )	Employees: $n = 198$ ; Supervisors: $n = 85$	Employee: Questionnaire <sup>d</sup> Supervisor: Telephone interview <sup>e</sup>	Employee: 1 year; Supervisor: follow up	Employee: not provided; Supervisor: not applicable



Table 5 continued

Study	Score	Design	Recruitment and source population	Case definition	Response	Numbers enrolled	Measurement	Follow-up	% Lost to follow-up
Nieuwenhuijsen et al. [26]	16	Part of longitudinal cohort study; measurements at baseline, 3, 6, 12 months	Consecutive patients reported by 30 occupational physicians of 9 occupational health services; Amsterdam, The Netherlands; inclusion: march 2001–february 2002; source population $n = 277$	Employees on sick leave <6 weeks due to mental health problems <sup>f</sup> ; last visit to OP >3 months	Consent to participate: 76%; baseline questionnaire: 71%	$n = 188$	(1) RTW: Questionnaire Register (2) Diagnosis: Telephone version of CIDI versus 2.1 <sup>g</sup> DASS-depression <sup>h</sup> (3) Other predictors: Questionnaire	1 year	1.1%
Nieuwenhuijsen et al. [27]	14	Part of longitudinal cohort study; measurements at baseline, 3, 6, 12 months	Consecutive patients reported by 30 occupational physicians of 9 occupational health services; Amsterdam, The Netherlands; inclusion: march 2001–february 2002; source population $n = 277$	Employees on sick leave <6 weeks due to mental health problems <sup>f</sup> ; last visit to OP >3 months	Consent to participate: 76%; baseline questionnaire: 71%	$n = 188$	(1) Irrational belief: IBI <sup>j</sup> (2) Diagnosis: Telephone version of CIDI versus 2.1 <sup>la</sup> (3) Psychological symptoms: DASS <sup>i</sup>	1 year	1.1%
Vaez et al. [28]	14	Retrospective and prospective cohort study	Insurance company, Sweden; inclusion in 1999; random selection ( $n = 5,200$ ) of source population ( $n = 13,318$ )	Employees living in Sweden; aged 20–65 years; new sick-leave spell $\geq 90$ days in 1999 due to psychiatric diagnosis, burnout or exhaustion;	100% (registry data)	Included: $n = 4,891$	Registry data 1996–2002 from: Insurance company Social insurance board	Retrospective: 1996–1999 Prospective: 1999–2002	0%

<sup>a</sup> General Health Questionnaire (12 items)<sup>b</sup> Depression subscale (16 items) of Symptom Check List (90 items)<sup>c</sup> Job Content Questionnaire<sup>d</sup> Baseline: age, gender, occupation, self reported cause of mental health problem; Depression Anxiety Stress Scale (DASS): severity of psychological symptoms; during follow up: absence data<sup>e</sup> Standardized, with 19 questions<sup>f</sup> Psychological symptoms not caused by a somatic disorder<sup>g</sup> Sections: major depressive disorder, panic disorder, social phobia, somatoform disorder, bipolar disorder, obsessive–compulsive disorder, post-traumatic stress disorder, psychotic disorder<sup>h</sup> Depression Anxiety Stress Scale; cut-off >12<sup>i</sup> Psychological symptoms not caused by a somatic disorder<sup>j</sup> Irrational Beliefs Inventory 50-item<sup>k</sup> Sections: major depressive disorder, panic disorder, social phobia, somatoform disorder, bipolar disorder, obsessive–compulsive disorder, post-traumatic stress disorder, psychotic disorder<sup>l</sup> 42-item



**Table 6** Outcome, prognostic factors and results

Study	Outcome (dependent variables)	Prognostic factors (independent variables)	Results
Breninkmeijer et al. [22]	Depressive symptoms	(1) Demographics <sup>a</sup> (2) Work characteristics <sup>b</sup> (2) Work resumption <sup>c</sup> (3) Actions by employers <sup>d</sup>	Significant factors ( $P < 0.05$ ) for (1) Increased risk: Lower education: $\beta = 0.10$ Sole breadwinner: $\beta = 0.14$ (2) Decreased risk: Partial or full work resumption: resp. $\beta = 0.13$ , $\beta = 0.30$ Changing work tasks: $\beta = 0.10$ Logistic regression to estimate ORs; significant risk factors healthy versus unhealthy state 3 years after initial sickness absence: (1) Healthy: Male gender: OR 1.637 ( $P < 0.05$ ) (2) Unhealthy: Age: OR 16.961 (16–29 years, $P < 0.01$ ); OR 4.807 (50–59 years, $P < 0.01$ ) Unemployment: OR 0.468 ( $P < 0.01$ ) History of previous sickness absence OR 0.617 ( $P < 0.01$ ) Multiple diagnosis (stress-related and shoulder/back pain) OR 0.576 ( $P < 0.01$ )
Engström and Janson [23]	Dependency on sickness insurance c.q. full/partial (healthy state) or no work resumption (unhealthy state)	(1) Demographics <sup>e</sup> (2) Labour market data <sup>f</sup> (3) History of previous sickness absence	Kaplan–Meier survival analysis to estimate univariate relations: (1) Longer time to first RTW: Deviant PI interventions aimed at organization ( $P = 0.02$ ) Deviant PI continuity of care ( $P < 0.0001$ ) (2) Longer time to full RTW: Age $> 50$ ( $P = 0.02$ ) Cox proportional hazard ratio (HR, 95% CI) analysis to estimate multivariate associations: (1) Longer time to first RTW: Deviant PI interventions aimed at organization: HR 0.5 (0.3–0.9) Deviant PI continuity of care: HR 0.3 (0.2–0.5) (2) Longer time to full RTW: Deviant PI continuity of care: HR 0.3 (0.2–0.5) Cox regression analysis to estimate hazard ratios (HR, 95% CI) indicating time to RTW: (1) Shorter time to full RTW: Communication with employee (non-depressed only): HR 3.5 (1.4–8.9) (2) Longer time to full/partial RTW: Consulting with professionals: HR 0.4 (0.2–0.9)
Nieuwenhuijsen et al. [24]	Time to full/partial return to work (RTW)	Performance indicator (PI) <sup>g</sup> of occupational physician (OP)	
Nieuwenhuijsen et al. [25]	Time to full/partial RTW	(1) Supervisor behaviour <sup>h</sup> (2) Conditional factors <sup>i</sup>	

**Table 6** continued

Study	Outcome (dependent variables)	Prognostic factors (independent variables)	Results
Nieuwenhuijsen et al. [26]	Time to full RTW	(1) Disorder related factors <sup>j</sup> (2) Personal factors <sup>k</sup> (3) Environmental factors <sup>l</sup>	Cox regression analysis to estimate hazard ratios (HR, 95% CI) indicating time to full RTW: Longer time: Age $\geq 50$ : HR 0.5 (0.3–0.8) Expectation of duration $>3$ months: HR 0.5 (0.3–0.8) Educational level medium/high: HR 0.5 (0.3–0.8) Depression/anxiety disorder: HR 0.7 (0.4–0.9) Repeated measurements MANOVAs to describe relation of change in irrational beliefs and symptom recovery: Magnitude/direction of change in irrational beliefs are related to magnitude of recovery of depressive, anxiety, stress symptoms over time Design not suited to assess temporal relationship beliefs/symptoms To predict DP: logistic regression to estimate adjusted ORs (95% CI): Higher risk: Age 55–61: OR 6.30 (4.80–8.09) Low SES: OR 3.40 (2.28–5.08)
Nieuwenhuijsen et al. [27]	Symptom recovery	Change in irrational beliefs	
Vaez et al. [28]	(1) Sickness absence (2) Disability pension (DP)	(1) Demographics <sup>m</sup> (2) Previous sickness absence <sup>n</sup>	

<sup>a</sup> Gender, age, education, care for children, breadwinner's role, marital status<sup>b</sup> Variable work schedule, management function, reorganization, job insecurity, leadership quality, years in organization, years in function, working hours, overtime work, travelling hours, size of organization, physical load/risk, chemical risk, decision latitude, task demands, work atmosphere<sup>c</sup> Partial or full work resumption<sup>d</sup> Change of tasks, reduction of tasks, reduction of hours, equipment/aids/courses, showing interest, change of position/department<sup>e</sup> Age, gender<sup>f</sup> Occupation, employer type, full- or part-time work, work-related diagnosis<sup>g</sup> Assessment of symptoms, correct diagnosis, evaluation of curative care, assessment of work related causes, assessment of impediments, interventions aimed at individual, interventions aimed at organization, interventions aimed at providers of care in the curative sector, timing of first consultation, continuity of care<sup>h</sup> Communication with the employee, promoting gradual return to work, consulting with professionals<sup>i</sup> Financial consequences, rehabilitation, responsibility, motivation, work performance, work relationship<sup>j</sup> Diagnosis, level of depressive symptoms, work-relatedness of the diagnosis, pre-baseline duration of the disorder, pre-baseline sick leave days<sup>k</sup> Gender, age, marital status, recovery expectations, educational level<sup>l</sup> Job demands, supervisory support, co-worker support<sup>m</sup> Gender, age, occupation, socio-economic status<sup>n</sup> 4 levels:  $<17$  days (short); 17–90 days (intermediate); 91–365 days (long term); granted disability pension

**Table 7** Overall level of evidence

Category	Prognostic factor	Outcome	Studies	Pos. findings (increase)	High quality	Neg. findings (decrease)	High quality	Level of evidence	Modifiable
Health	Stress-related and shoulder/back pain	Disability	1	1/1 (100%)	1	–	–	Limited	+
	Depression/anxiety disorder	Disability	1	1/1 (100%)	1	–	–	Limited	+
Personal	Older age	Disability	4	4/4 (100%)	4	–	–	Strong	–
	Gender (male)	Disability	1	1/1 (100%)	1	–	–	Limited	–
	Medium/higher education	Disability	1	1/1 (100%)	1	–	–	Limited	–
	Lower education	Symptoms	1	1/1 (100%)	1	–	–	Limited	+
	Sole breadwinner	Symptoms	1	1/1 (100%)	1	–	–	Limited	+
	Partial/full RTW	Symptoms	1	–	–	1/1 (100%)	1	Limited	+
	History of previous sickness absence	Disability	1	1/1 (100%)	1	–	–	Limited	–
	Own expectation of duration >3 months	Disability	1	1/1 (100%)	1	–	–	Limited	+
	Low socio-economic status	Disability	1	1/1 (100%)	1	–	–	Limited	+
External	Changing work tasks	Symptoms	1	–	–	1/1 (100%)	1	Limited	+
	Unemployment	Disability	1	1/1 (100%)	1	–	–	Limited	+
	Deviant OP interventions aimed at organization	Disability	1	1/1 (100%)	1	–	–	Limited	+
	Deviant continuity of OP care	Disability	1	1/1 (100%)	1	–	–	Limited	+
	Supervisor communication with employee	Disability	1	–	–	1/1 (100%)	1	Limited	+
	Supervisor consulting with professional	Disability	1	1/1 (100%)	1	–	–	Limited	+

of depressive symptoms. These findings are in line with the results of other research on disorder-related predictors of disability [30–33]. However, in general, in most studies addressing the relation between mental health and disability, mental health problems are poorly defined or use different diagnostic criteria and associations are not diagnosis-specific [6, 16]. Research data show an existing association between specific mental disorders and duration of disability, but nature and direction of this association remains to some extent unclear. It could be that multiple moderating or mediating factors are involved with effect-sizes depending on the severity of the disorder. It seems plausible that less severe mental disorders, such as dysthymia, adjustment disorder or simple phobia, are more susceptible to moderators than more severe disorders, such as major depressive disorder, bipolar disorder or psychotic disorders.

#### Personal Factors

We found strong evidence that older age (>50 years) is associated with continuing disability and longer time to RTW. This finding corresponds with the results of other systematic reviews [34]. In many western industrialized countries the age of the work force increases, due to

demographic developments and government policies. As a result of this ageing process, occupational and insurance physicians and labor experts will encounter an increasing number of older workers unable or having increasing difficulties to perform their work tasks. Older workers and disability claimants are at a higher risk for continuing or even permanent disability and for a longer time to RTW. As age is not modifiable, the attention of professionals in occupational and insurance health care should be directed at other factors that are amenable to change, especially when dealing with older workers.

We found limited evidence for the association of gender with duration of disability and RTW. One included study found that in the third year of follow-up, men are 50–60% more likely to be in a healthy state than women, indicating a shorter duration of long term disability for men [23]. This finding is contrary to other research [35]. In four studies that we included in the present review, no significant effect of gender on disability and RTW outcome was found, whether analyzed as a potential confounder [24–26], or as an independent variable [28], and in one study the effect of gender on outcome was not investigated [27]. One included study found a non-significant effect of gender on the course of depressive symptoms [22]. These opposing results as to the effects of gender differences on duration of disability

and time to RTW due to mental health problems are illustrative for the literature on this topic in general [6, 36].

One included study found, unexpectedly, that a high level of education predicted a longer time to RTW [27]. To our knowledge, there are no other studies to corroborate this. Another included study reported that a lower education increased the risk of depressive complaints, attributing to a longer time to RTW [22]. This is more in line with the literature on this subject [13, 16].

We found limited evidence that being the sole breadwinner increased the risk of prolonged depressive symptoms and contributed to a delayed RTW and disability [22]. However, in a Dutch study being the sole breadwinner significantly predicted RTW after long-term sick leave due to low back pain [37].

There is limited evidence that history of previous sickness absence is related to duration of disability and time to RTW. This is not surprising, since past sickness absence may be related to chronic health problems. This finding is in accordance with other research on this topic [38, 39].

There is limited evidence that absentees own expectation of disability duration >3 months is associated with longer time to RTW. This finding corresponds with the results of other studies [40]. In studies investigating the association of own expectation with health outcomes, Bandura's concept of self-efficacy was most commonly accepted as underlying theoretical model [41].

We found limited evidence that low socioeconomic status predicted disability pension [28]. Indeed, many studies have documented the inverse relation between social class and morbidity, mortality, sickness absence and disability [42, 43].

### External Factors

We found limited evidence that full or partial RTW and changing work tasks is associated with recovery of depressive symptoms. However, a Cochrane systematic review found little evidence that RTW i.e., supported employment improved symptoms, quality of life or social functioning [44].

One of the studies included in the present review found that the unemployed are less likely to be in a healthy state compared with the employed, indicating lower probabilities of RTW after long-term stress-related sickness absence [23]. This is in line with other studies [13, 16, 38]. However, due to few number of studies, little is known about underlying causes [45].

In the present review, we found limited evidence for the association of quality of occupational guideline-based care with disability and RTW. This is corroborated by results of other studies [46–48]. However, in a recent Cochrane

review it was found impossible to investigate the effectiveness of workplace interventions among workers with mental health problems and other health conditions due to lack of studies [49].

We found limited evidence that continuity of occupational care shortens the duration of sickness absence of patients with adjustment disorder. Although the criteria for optimal performance in continuity of care differed as to frequency of contacts and number of different physicians, this finding is consistent with other studies on the relation of quality of care and outcome in patients with low back pain and in cancer survivors [50, 51]. To our knowledge, there are no other studies investigating this relation in sick listed workers with mental health problems.

We found limited evidence that frequent supervisory communication with workers with mental health problems decreased duration of disability. Sick listed workers may perceive good communication with their supervisor as social support. This finding corresponds with the insight that workplace support play an important role in disability management and enhances RTW [52, 53]. However, in one of the studies that we included for this review, it was found that this effect of support is beneficial in persons with low depression scores only [25]. Depressed workers may benefit less from communication with their supervisor. This is in line with the results of a recent study showing that more perceived social support is actually a barrier to RTW [54]. This is suggestive for a moderating effect of social support on the effects of mental health factors on RTW.

We found limited evidence that supervisor consulting with other professionals is more often associated with a longer duration of sickness absence. It is plausible that this relation is confounded by the severity of depressive symptoms: supervisors may consult occupational physicians more often if a problematic future RTW is foreseen in workers with more depressive symptoms, resulting in a later RTW.

### Methodological Considerations

From a total of 796 articles, we only could find seven articles that fulfilled all our inclusion criteria. Moreover, four articles described results from the same cohort. Observational studies with non-significant results are less likely to be published [55]. Therefore, the few number of studies found for the present review could have resulted from publication bias. Also, the possibility that relevant articles remained undiscovered in databases that are difficult to locate cannot be excluded. Nevertheless, we believe that the small number of studies found was mainly the result of the strict definition of our inclusion criteria.

Our search strategy was to conduct a broad search using the search terms stated in Table 1, combined with specific criteria for in- and exclusion as to types of studies,

participants and outcome measures, stated in Box 1. We did not include terms for minor mental health problems since we were interested in more severe mental disorders only and their association with long term disability. These major mental disorders, such as depressive disorder, anxiety disorder and adjustment disorder, are covered by the MeSH term Mental Disorders. We formulated strict in- and exclusion criteria: we selected studies among persons already receiving disability benefit at baseline only. Furthermore, in order to include all durations, we decided not to use the duration of sick leave or disability as an in- or exclusion criterion. By doing so, we prevented our search being biased by the fact that in research on disability the term long-term disability is not uniformly defined. We were interested in RTW as outcome. In general, studies on RTW focus on short term disability, while the interest of the present review lies primarily with long term disability. Therefore, we did not include RTW as a search term, but instead used it as an inclusion criterion.

To assess prognostic factors in a reliable way, prognostic studies need well defined inception cohorts of participants all at the same stage of their medical condition. Of the seven included studies, two studies did not use such an inception cohort, i.e., the duration of preceding sickness absence varied at baseline. This could have biased the assessment of prognostic factors. In four studies, treatment was not fully described or standardized. In these studies, unknown treatment could have confounded the assessment of prognostic factors. In two studies little or no information was presented of completers versus loss to follow-up. This also could have caused a biased assessment of prognostic factors. In the studies we included for this review, both the duration of disability at baseline and the time of follow-up varied. A relatively short follow-up time of 1 year was used in five studies. It cannot be excluded that effects of the prognostic factors found in these studies change over time, or that new factors arise, after the follow-up period ended.

To enhance the quality of future cohort studies on long term disability, we recommend (1) the use of an inception cohort at baseline; (2) to describe or standardize treatment or at least analyze the confounding effect on the prognostic factors studied; (3) a cohort large enough to allow diagnose-specific subgroup-analyses.

## Conclusion

Factors that cannot be modified by any intervention program are useful in predicting disability/RTW outcome and identifying persons, groups or places at risk, but only modifiable factors can provide a sound basis for interventions. We identified four non-modifiable risk factors (older age, male gender, medium/higher education, history of previous

sickness absence). We considered 13 factors to be amenable to change: two health related factors (stress-related and shoulder/back pain, depression/anxiety disorder), five personal factors (lower education, sole breadwinner, partial/full RTW, absentees own expectation of duration >3 months, socioeconomic status) and six external factors, all job-related (changing work tasks, unemployment, deviant occupational interventions aimed at organization, deviant continuity of occupational care, supervisor communication with employee, supervisor consulting with professional).

Some results of this systematic review are more or less consistent with findings in other studies, i.e., mental health factors [30–33], age [16, 34], history of previous sickness absence [38, 39], negative recovery expectation [40], socio-economic status [42, 43], unemployment [13, 16, 38], quality and continuity of occupational care [46–48, 50, 51], while other oppose existing evidence i.e., gender [6, 35, 36], level of education [13, 16], sole breadwinner [37], supervisor support [54].

Nature and severity of specific mental disorders remain strong predictors of disability and RTW due to poor mental health. Therefore, monitoring, assessing and contributing to optimize medical treatment is an important tool for occupational and insurance physicians to reduce duration of sickness absence and to prevent permanent disability.

There is consistent evidence that older age is significantly associated with the risk of continued disability. Confronted with an ageing work force, occupational health care should be targeted at prevention of long-term sickness absence among older workers at risk for continuing disability due to mental health problems. Interventions aimed at RTW of older absentees should be based on modifiable factors and effectuated without unnecessary delay. Such interventions should not a priori be omitted because of undue pessimism about chances based on age alone. Since older age is so clearly an important prognostic factor of continuing disability, policies at governmental and employer level should be directed at effective strategies to prevent sickness absences among older workers. To the benefit of workers already on sick leave, future research could be aimed at the development of age-specific interventions.

The finding that past sickness absence is related to duration of future disability and time to RTW is confirmed by related literature [38, 39]. Optimal managing of frequent short term sickness absence prevents long term disability.

Negative recovery expectations predict a longer time to RTW. Occupational care can help turning negative into positive expectancies by a cognitive-behavioral approach. The effectiveness of such interventions remain to be investigated.

In epidemiologic research, socio-economic status is often measured including level of education and unemployment. There is ample evidence in the literature that

lower socio-economic status is a high risk factor of long term disability [28, 42, 43]. However, the role of education level in the disability process of persons suffering from poor mental health needs further clarifying.

The evidence found in the present review and related literature suggest that good quality and continuity of occupational guideline-based care is associated with a shorter duration of disability and time to RTW.

The gender-effect on disability and RTW remains unclear. More studies are needed to clarify mechanisms underlying the effect of gender on duration of long term disability and RTW. With the ICF-model as a guideline, future research can identify personal, job- and health-related factors that moderate and mediate the gender-effect.

It is hypothesized that being the sole breadwinner is a financial incentive to RTW, but whether or not employees with a bigger financial need return more often back to work, irrespective of their health, remains unclear.

Social support in the work place in general has a beneficial effect on RTW, but may be an unexpected barrier

for persons in poor mental health. This warrants further research.

To conclude, there is still great need for high quality cohort studies to find relevant prognostic factors of long term disability among benefit claimants with mental health problems who are sick listed at baseline. Understanding these factors, and in particular those which are amenable to change through any intervention program, may help to develop effective prevention and intervention strategies to shorten the duration of disability and facilitate RTW.

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## Appendix

See Appendix Table 8

**Table 8** Operationalization of criteria list for quality assessment

Study population	A Inception cohort
	One point if patients are identified at an early uniform point in the course of their disability e.g., uniform period after first day of sick leave
	Zero point if it is not clear if an inception cohort was used
	B Description of source population
Follow-up	One point if the source population is described in terms of place of recruitment (for example: Groningen, the Netherlands), time-period of recruitment and sampling frame of source population (for example: occupational health service, organization for social security)
	Zero point if $\leq 2$ features of source population are given
	C Description of relevant inclusion and exclusion criteria
	One point if $> 2$ criteria are formulated
	Zero point if $\leq 2$ criteria are formulated
	D Follow-up at least 12 months
	One point if the follow-up period is at least 12 month and data are provided for this moment in time
	E Drop-outs/loss to follow-up $< 20\%$
	One point if total number of drop-outs/loss to follow up $< 20\%$ at 12 months
	F Information completers versus loss to follow-up/drop-outs
Treatment	One point if sociodemographic information is presented for completers and those lost to follow-up/drop outs at baseline, or no loss to follow-up/drop outs. Reasons for loss to follow-up/drop outs have to be unrelated to the outcome. Loss to follow-up/drop outs: all patients of the assembled cohort minus the number of patients at the main moment of measurement for the main outcome measure, divided by the total number of patients of the assembled cohort
	G Prospective data collection
	One point if a prospective design is used, or a historical cohort when the prognostic factors are measured before the outcome is determined
	Zero point if a historical cohort is used, considering prognostic factors at time zero which are not related to the primary research question for which the cohort is created, or in case of an ambispective design
	H Treatment in cohort is fully described/standardized
	One point if treatment subsequent to inclusion into cohort, is fully described and standardized, or in case of no treatment is given, or if multi-variate correction for treatment is performed in analysis
	Zero point if different treatment is given and if it is not clear how outcome is influenced by it, or if it is not clear whether any treatment is given



**Table 8** continued

Prognostic factors	I Clinically relevant potential prognostic factors One point if besides socio-demographic factors (age, gender) at least one other factor of the following is described at baseline: <i>Health related factors</i> (congenital or acquired vulnerability, psychiatric diagnosis, comorbidity, psychotrauma, physical condition) <i>Personal factors</i> (cognition, attitude, beliefs, efficacy, activity, avoidance behavior, coping, therapy compliance, employment, education, income, marital status, residence) <i>External factors</i> (physical or psychosocial job characteristics, employer characteristics, social support, health care system, social security system, social benefit)
	J Standardized or valid measurements One point if at least one of the factors of I, excluding age and gender, are reported in a standardized or valid way (for example: questionnaire, structured interview, register, patient-status of occupational/insurance physician)
	K Data presentation of most important prognostic factors One point if frequencies, or percentages, or mean (and standard deviation/confidence interval), or median (and Inter Quartile Range) are reported for the three most important factors of I, namely age, gender and at least one other factor, for the most important follow-up measurements
	L Clinically relevant outcome measures One point if at least one of the following outcome criteria for change is reported: symptom, functioning, daily life activities, disability, return to work
Outcome	M Standardized or valid measurements One point if one or more of the main outcome measures of L are reported in a standardized or valid way (for example: questionnaire, structured interview, registration, patient-status of occupational/insurance physician)
	N Data presentation of most important outcome measures One point if frequencies, or percentages, or mean (and standard deviation/confidence interval), or median (and Inter Quartile Range) are reported for one or more of the main outcome for the most important follow-up measurements
Analysis	O Appropriate univariate crude estimates One point if univariate crude estimates (RR, OR, HRR) between prognostic factors separately and outcome are presented Zero point if only <i>P</i> -values or wrong association values (Spearman, Pearson, sensitivity) are given, or if no tests are performed at all
	P Appropriate multivariate analysis techniques One point if logistic regression analysis is used, or survival analysis for dichotomous outcomes, or linear regression analysis for continuous outcomes Zero point if no multivariate techniques are performed at all

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